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Tsyganov on Factors In Air Defense

[In a discussion of the origin and development of air defense in the Soviet Union prior to the revolution:]

Along with the creation of air defense means was the development of the organizational forms, the control system and also the methods of conducting combat operations....(page 5)

Air defense, as an important mission and a new type of combat operation of the Armed Forces, came into existence and was initially developed during World War I....

Toward the end of World War I, air defense acquired a definite structure, and models of special armament were developed for combat against enemy aircraft: antiaircraft guns, fighter aircraft, barrage balloons, antiaircraft searchlights, and other means. (page 7)

[In discussing the development of air defense in the period between the Civil War and World War II:]

Together with the development of air defense means, the number of PVO troops increased and the organizational structure of air defense and the methods of conducting combat operations were improved.... Air defense units included units of the various arms of the PVO troops; antiaircraft artillery, antiaircraft machine gunnery, antiaircraft searchlights, barrage balloons, and air observation, warning and communication. A great shortcoming in this system was that fighter aviation -- a most important means of air defense -- was not included in the structure of PVO, but remained subordinate to the air forces command....

From 1940-1941, changes in the organizational structure of the PVO took place. Based on the decisions of the Soviet government, the territory of the Soviet Union was divided into air defense zones. The air defense zones, in turn, were divided into air defense regions (rayony) with PVO stations (punkty) within these regions. The PVO troops were equipped with the most varied armament produced in the USSR, many models of which were not inferior to the armament of foreign armies and which, in a number of cases, surpassed them. However, at the beginning of the war, the process of rearming the PVO troops with new equipment was not completed. The fact that the PVO means were not integrated and that there was a great shortage of materiel and transport had a negative influence during the first days of the war.

Despite the aforementioned shortcomings, a stable system of air defense, which constituted a formidable force against an air enemy, had been created in the Soviet Union by the beginning of World War II.

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Maj Gen Nagorniy, now Col Gen (Res), was chief of staff of the Main PVO Administration since the first days of its inception.... (page 19)

[In discussing some of the missions of PVO during World War II:]

The air defense of Moscow was established long before the war. It included large forces of fighter aviation, antiaircraft artillery, anti-aircraft machine guns, and other means of air defense.... (page 25)

World War II was marked by the appearance of new means of air attack and air defense. Jet-powered aircraft, winged and ballistic missiles, guided and unguided missiles, and finally, the atomic bomb -- constitute a far from complete list of new types of armament created by 1945. Radar was also broadly used. Short-range and long range aircraft navigation systems, an identification system, radar sights, and radio fuzes were created. Means of combatting radioelectronic devices appeared. The widespread use of new equipment and the increasing speeds and flight altitudes of the air defense means posed the very urgent need to solve rapidly the problem of automating PVO means and troop control. In the last years of the war and the early postwar years, instruments were created for the automatic guidance of fighters against targets and also for directing antiaircraft fire.

In the postwar years, the PVO troops acquired in their armament the latest jet-propelled and rocket equipment, which ensure the destruction of any air and space means of attack. (page 35)

Among the means of aerial and space attack abroad are ballistic and cruise-type missiles of various ranges, missile-carrying submarines, strategic, tactical, and carrier-based aircraft, artificial earth satellites and various space devices.

Ballistic missiles are considered the most effective means of delivering nuclear charges against the targets. Possessing virtually unlimited range and a great rate of speed (up to 25,000 kilometers per hour), the missiles are less vulnerable targets than aircraft.

Ballistic missiles are considered a most effective means of delivering nuclear charges to the targets. They have great flight speeds (5,000-25,000 kilometers per hour), a very high trajectory (100-1,300 kilometers), and their warhead, as a rule, separates and constitutes a small target of minimum vulnerability. (page 36)

[Following a review (pages 36-38) of US intercontinental missiles, capabilities of US aircraft and such "military satellites" as Midas and Samos:]

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At the present time, the grouping of air and space forces of the imperialist states has been carried out with consideration that at any time they can be used for a surprise nuclear attack. Judging by the data of the foreign press, it is proposed that for delivery of the first nuclear blows the maximum number of combat-ready ballistic missiles of various designation, as well as aircraft carrying nuclear ammunition, be used. The nuclear blows are to be inflicted simultaneously against important targets both in the theaters of military operations and in the deep rear of the country. (page 39)

It should be noted that in development of the missiles, the Americans have not achieved supremacy over the Soviet Union. The nuclear and rocket weapons available to the Soviet Armed Forces have unlimited devastating power. One rocket with a powerful nuclear charge exceeds the power of all the explosive elements produced throughout the entire world during World War II.

Soviet strategic rockets have unlimited flight range and a high degree of accuracy.

The Soviet Union has also far surpassed the United States in the peaceful utilization of space. Soviet cosmonauts and space ships of our Motherland have demonstrated to the entire world their courage, heroism, and unlimited devotion to the Communist Party and to their people....

The appearance of nuclear weapons and various means of air and space attack and their constant quantitative growth and qualitative improvement have engendered deep, genuinely revolutionary changes in the nature and means of conducting combat operations on various levels, as well as war on the whole. There has been an unusual increase in the importance of the initial period of war and the factor of surprise attack. Differences between the front and the rear of the country have almost completely disappeared. It has actually become possible to deliver devastating nuclear blows at the most remote regions and centers of hostile states.

A surprise air and space attack employing nuclear weapons can now result in immense destruction and the loss of millions of people.

The US press gives estimates of possible destruction and consequences of nuclear attack. It indicates, for example, that if 263 thermonuclear blows with the average equivalent of 5 million tons each are inflicted on important objectives in the United States, they would destroy 132 large military sites and many varied military industrial enterprises, as well as 71 large cities. The total area of radioactive contamination in this case would involve almost one half of the country. As a result of this, half of the population would sustain an attack by nuclear weapons.

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A total of 53 million people would be killed. To put West Germany out of operation, according to foreign data, no more than eight nuclear charges with a yield of 5 million tons each would be needed.

The importance of PVO troops and their responsibility for the safety of the state in these conditions has increased sharply.

They have the extremely important mission of defending the country and its population from strikes by air and space forces of the enemy, safeguarding the normal everyday life of the country and maintaining the combat readiness of the Armed Forces.

To fulfill this mission, the PVO Strany Troops are developing their combat procedures early, in peace time, equipping their command posts, occupying their positions, and creating a single system of air defense. The PVO forces and means are protecting the more important administrative-political centers and industrial regions, communications, naval bases, large arsenals, and other sites which constitute the basis of the economic and military might of the country. The PVO forces and means are situated, taking into consideration the importance of the areas and targets being defended.

PVO troops must carry out very complex and responsible missions in the initial period of war. Along with other branches of the Armed Forces, they must frustrate a nuclear attack by the enemy, not permit the destruction of the vitally important targets and the mass destruction of the population, and protect the deployment and movement of the Armed Forces. These circumstances require that PVO be completely prepared from the very beginning of war and be maintained in constant combat readiness to repulse a surprise enemy attack.

The following factors have great importance in maintaining the PVO troops in a high degree of combat readiness: a well-organized reconnaissance system, the vigilant performance of duty, outstanding training of troops, and the capability for conducting active combat operations both during the day and at night, in any weather, and under any situation.

The PVO troops are carrying out their missions of protecting the country by destroying air and space means of attack in flight.

For almost 40 years, these means constituted manned aircraft. Under modern conditions, the PVO troops must ensure the interception and destruction not only of manned aircraft, but also of ballistic missiles and various space apparatuses. In other words, modern PVO must be not only antiaircraft, but also antirocket and antispace.

New missions have emerged in this connection which PVO troops have not encountered in the past. Among the most important of them, according to foreign specialist, are monitoring space and early detection and warning.

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The goal of early detection and warning is the prompt detection of artificial satellites and other space bodies, determination of the parameters of their movement, identification, and other data which can be used in organizing measures against them, as well as promptly warning state organs and the military command concerning the beginning of an enemy attack.

In the United States, a special system fulfills the function of observance and control over space. It utilizes the radar, radiometric, and optical means of various branches of the Armed Forces, scientific-research institutes, and firing ranges for the observation of space. The data which arrives from them concerning detected space objects is processed, computed, and displayed with the help of high-speed electronic computers.

Very high demands are made on the effectiveness of air defense. While it was sufficient to destroy 15-20 percent of attacking aircraft to disrupt an aerial operation during World War II, under modern conditions, one aircraft or one missile with a nuclear charge which penetrates the target can inflict irreparable damage. Therefore, all means of air and space attack are subject to destruction.

Air defense must be characterized by viability and stability, i.e., by the capability to maintain a high degree of effectiveness under conditions attending the mass utilization by the enemy of nuclear weapons, radio and radar interference, and radioactive contamination of large areas.

It should be noted that the efforts of all branches of the Armed Forces are required for the reliable defense of the country from nuclear attack. Strikes by rocket troops, aircraft, and the rocket-carrying naval forces against aircraft and rocket bases and nuclear-weapons storehouses can undermine considerably the aircraft and nuclear-rocket might of the enemy and facilitate for PVO troops the battle against air and space means. In turn, the successful operations of PVO troops in the destruction of the aerial enemy can ensure the defense of groups of rocket troops, ground troops, aircraft, and naval forces from nuclear attack by the enemy and will permit them to carry out more successfully operation on land, in the sea, and in the air.

The forces and means of civil defense also have an important role in the protection of the country. They have the mission of quickly eliminating the effects of enemy nuclear strikes, organizing the evacuation of the population from regions subject to nuclear attack, providing immediate medical assistance to victims, maintaining proper order, and carrying out other necessary measures.

During peace time, PVO Strany Troops are on constant combat duty in carrying out their combat missions of protecting the aerial boundaries of the Soviet state from violation by foreign aircraft and other flying

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apparatuses operating for hostile purposes (reconnaissance, dropping of spies, etc).

At the same time, they are in constant combat readiness to destroy air and space means of attack.

The development of PVO means, their increased role and importance in modern war, and the extreme importance of the missions carried out by them in defending the main economic regions, administrative-political and industrial centers, and other important sites have resulted in a separation of PVO Strany Troops into an independent branch of the Armed Forces.

They consist of a combination of forces and means capable of combating various types of flying apparatuses -- aircraft, dirigibles, cruise-type and ballistic rockets, and other means of air and space attack.

PVO Troops consist of such types of troops as antiaircraft rocket troops, rocket-carrying fighter aircraft, and radio-technical troops, as well as special troops, engineer and communication troops, etc.

Air Defense rocket troops constitute the basis of the active means of PVO. Their armament includes rocket complexes for various purposes. These weapons are highly effective and can destroy all types of modern aircraft and cruise-type missiles at high and low altitudes and at supersonic speeds at any time of the day and in any weather. The following data testify to the high combat effectiveness of surface-to-air guided missiles.

During World War II, an average of 400-600 shells were expended in the destruction of one bomber by antiaircraft artillery. A modern aircraft, which has a much greater speed and altitude, can be shot down with one or two surface-to-air missiles.... (pages 40-44)

Large airfields with hard take-off and landing strips are needed for the basing of fighter aircraft; these can be put out of operation at the beginning of a war. Foreign designers are striving to overcome this shortcoming by creating fighters with vertical take-off and landing capability, as well as fighters with short take-off capability which are able to operate from small airfields and platforms.

Radio-technical troops, figuratively speaking, are the "eyes" of air defense. They constantly observe the sky, identify targets, and inform PVO troops and civil defense organs about them. Radio-technical troops also provide for guiding fighters and surface-to-air guided missiles against the enemy.

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Radar stations constitute the main armament of radio-technical troops. Modern radar detection stations used in the air defense of capitalist countries can detect bombers at a distance of up to 400-500 kilometers. (page 48)

[In discussing generally the importance of radar stations in detecting and identifying enemy aerial targets and the Dow Line and BMEWS systems:]

Americans themselves feel that this system cannot fulfill all its missions -- it does not ensure the early detection of global rockets.

In the postwar period, in connection with the brisk development of missile technology, it has become extremely important to create anti-rocket weapons capable of intercepting and destroying ballistic rockets in flight. As is known, the problem of destroying rockets in flight has been successfully solved in the Soviet Union... (page 50)

In modern conditions, PVO constitutes an orderly system created in a timely manner and united in a single command, which permits the effective utilization of all PVO forces and means in organizing the defense of the country.

Unified, automated technical complexes are being created to control PVO forces and means. Means of automation are being used in all elements of troop control. This permits an increase in the speed and accuracy of data processing on the aerial situation and it helps the commander and staff to develop a more correct decision and to convey it to the troops in a minimum period of time.

One example of automated systems is the American semi-automatic system for controlling active air defense means, known under the name of Sage....

The Sage system permits the allocation of targets among various air defense means, the automatic transmission of the necessary commands to the fighter-interceptor until the on-board radar of the fighter detects the target, and the automatic guidance of long-range anti-aircraft missiles to the aerial targets.

In addition to the automated system which all air defense troops have there are local automated systems. Thus, to control a group of surface-to-air missile batteries defending one site, in the United States, for example, the Missile-Master system is used....

A branch communications network is a very important element in any automated control system. It includes wiring and radio and radio-relay facilities with an apparatus which ensures speed, stability, and continuity of transmission and reception of commands, orders, and reports. (cont'd)

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The overall picture of the course of combat operations can be presented as follows. The PVO radar system and other means of reconnaissance conduct a 24-hour observation of the air and space. They detect and identify each target over the territory of the country and the adjacent areas. In case of detection of an enemy air attack, all the PVO forces and means are prepared to repulse it. Active PVO means are put into operation in accordance with the degree of proximity of the enemy aircraft and missiles.

Under conditions attending the use of varied means of attack -- various types of aircraft and ballistic and cruise-type missiles -- the combat operations of the PVO troops will develop very quickly. A characteristic of the combat operations will be the vast and sharp changes in the situation and the high degree of intensity and short duration of individual engagements. PVO soyedineniya and chasty will often have only several minutes to intercept and destroy the aircraft and other targets. Therefore, they must operate extremely efficiently and without effort in striving to fulfill unconditionally their assigned mission.

It can be assumed that engagements with the aerial enemy will develop simultaneously in various directions and at various altitudes, including the stratosphere and space.

The aerial enemy, in order to slacken the air defense, will create intensive interference against radio and radar stations, will inflict strikes against military formations and control centers, and will use diversionary aerial operations. All this requires that the soyedineniya and chasty of all arms of PVO troops be able to operate in conditions attending great losses, destruction, and radioactive contamination of large areas. Along with the repulsion of aerial targets the PVO troops in a number of instances will have to eliminate the effects of enemy strikes and restore the disrupted military formation.

Excerpts from brochure, Voyska Protivovozdushnoy Oborony (Air-Defense Troops)

By Col. Gen N. V. TSYGANOV, *et al.*; by Col. Gen N. S. *et al.*  
Moscow, 1966 (Signed for the press 30 April 1966)

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Malinovskiy on Missile Production, Air Defense System (Ensures Destruction of "Any" Aircraft, "Various" Rockets)

"VAJDA: If you please, Comrade MALINOVSKIY, would you say something about the significant changes that have occurred in the armament and organization of the Soviet Armed Forces?

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"MALINOVSKIY: I dealt with this question in detail in my speech at the 23rd CPSU Congress. Briefly, I can say the following. We have taken a number of steps in the past few years for increasing the stock of nuclear armaments for various purposes and outfitting every branch of the Armed Forces with suitable means for hitting the target. As before, we have paid great attention to the development of strategic rocket units. A whole series of a fundamentally new type of rocket weapon has been created. We already possess a powerful rocket-carrying submarine fleet, which can ~~struck any~~ <sup>strike any</sup> annihilating blow at hostile targets on sea and on land alike. The atomic striking forces of our long-range rocket carrying ~~air~~ force has increased.

"We have created and introduced new and highly effective air defense rocket systems and systems of interceptor planes. Our air defense capabilities can be relied on to ensure the destruction of any kind of hostile planes and various rockets (legelharito raketa-rendszereket es elfogo-repulo-gepek komplexumokat...Legvedelmi eszkozeink megbizhatóan biztosítják az ellenség bármely repülőgépeinek és különféle rakétáinak megsemmisítését.)

"Our air forces have changed also qualitatively: the fighter-plane stock has expanded and improved. At the same time, our Armed Forces have been supplied with conventional combat weapons at an increased rate. Along with the equipment of the Soviet Army and Navy with the latest and most up-to-date technical means of warfare, the organization of the Armed Forces has also been brought to perfection.

"And yet the might of the Soviet Armed Forces does not lie in the first-class arms at their disposal alone, but is inseparable from the characteristics of our soldiers as men, their self-sacrificing devotion to our people, and their loyalty to the ideals of the Communist Party. The soldiers of our Army and Navy quite realize that their strength and invincibility lie in the leadership of the party and their indissoluble unity with the people. Our Army is well-trained and highly skilled in technical matters and possesses cadres loyal to the last to the party and the government.

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"I must definitely stress also the fact that fraternal friendship with the armies of the Warsaw Treaty nations has grown more profound in the past few years. This agreement, which has been created for the defense of our peoples' peaceful work, is permeated by the identity of interests of the socialist states.

"In concluding all this I can say that the Soviet Armed Forces, together with the fraternal armies, are capable of fulfilling their tasks of ensuring peace and defending the sacred borders of our fatherland and the entire socialist community; our Army and Navy are always ready to respond to the attack of any aggressor with an annihilating blow...."

Interview with Mar SU R. Ya. MALINOVSKIY,  
Minister of Defense USSR  
Budapest, 23 April 1966  
Budapest, Nepszabadsag, 23 April 1966

C-O-N-F-I-D-E-N-T-I-A-L